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Full Length Research

The role of public infrastructures in the competitiveness of Burkina Faso's exports in the WAEMU area

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This article investigates the leading factors of Burkina Faso intra-WAEMU exports competitiveness by highlighting the role of public infrastructure spending. A Granger causality test used for this task revealed a unidirectional causality from public infrastructure spending to export competitiveness. Also, a Tobit model applied to time series data from 1980 to 2015 shows that, in addition to public infrastructure spending, the GDP per capita, and the direct foreign direct investment ratio are positively and significantly affecting the country's intra-WAEMU exports competitiveness. However, the general level of prices has a negative and significant influence on the competitiveness of the country's intra-WAEMU exports.

Key words: intra-WAEMU export competitiveness, public infrastructure spending, Granger causality, Burkina Faso, JEL classification: C24-F43-H54.

INTRODUCTION

Despite the improvement of Burkina Faso (BF) volume of exports within the WAEMU (West African Economic and Monetary Union) area, its intra-WAEMU export rate reveals the undesirable situation of this country. The export rate is measured here by the percentage of sales made abroad whether for an enterprise, a sector or a country.

Burkina Faso's intra-WAEMU exports have grown steadily in recent years from. They went from 19066 million FCFA in 1980 to 1472649.53 million CFAF in 2015, representing an average growth of 12.83% over the entire period (BCEAO, 2016). The growth rate of exports was greater over the period from 2008 to 2015, i.e., 24.65% compared to 9.77% between 1980 and 2007.

The intra-WAEMU export rate of Burkina Faso remains one of the lowest of the Union. Ivory Coast with an average export rate of 0.322, Ivory Coast is ranked first in the competitiveness of intra-WAEMU exports over the period 1980-2015 (BCEAO, 2016). Then follow Mali (0.172), Togo (0.166), Senegal (0.142), Burkina Faso (0.134), Niger (0.11), Guinea Bissau (0.076) and Benin (0.064). From this ranking, it is noticed that Burkina Faso is among the countries that have the lowest intra-WAEMU export rates.

The low competitiveness of exports in Burkina Faso depends on a problem of organization, training, factor costs (energy and transport) and, above all, product quality (Banque Mondiale 1994; Sirima et al., 1999; Ouedraogo et al., 2003).

The review of the theoretical literature reveals that in order to benefit from the benefits of economic

openness, countries must strengthen their competitiveness, particularly in the external market. This view is shared by Verner (2015) that economic openness is beneficial only for competitive economies. The concept of export competitiveness refers to the capacity of the national economy to increase its market share compared to its competitors. It is recognized that in the current context of economic openness characterized by ever-increasing exchanges, it is now impossible for a country in the hinterland to improve its market share without properly understanding the problem of the effects of spending in Public transport, telecommunications, health, etc. This is strongly believable as the economic literature on the effects of public infrastructure spending on economic growth has reached a consensus which is that of their strong contribution to improving the productive capacity of the economy and strengthening of market access conditions. These two elements are crucial for improving the competitiveness of exports. From Meade's investigations (1952) through those of Aschauer (1989a,b) to Barro (1990) and Kopp (2007), it is perceived that spending on public infrastructure is considered as an essential instrument for ensuring a structural transformation of the economy, a pledge reinforcement of the market share and through direct and indirect effects they have on the gain in economic productivity.

On the determinants of competitiveness, economists generally agree on two sets of factors: demand factors that specify the type, quality of products, and the mode of financing and supply factors that highlight specialization, relative prices, tax rates and production costs (Artus, 1987). Although it is recognized as a driver of economic growth by several authors (Aschauer, 1989a, b; Barro, 1990; Banque Mondiale, 1994; Kopp, 2007), the role of public expenditure on public infrastructure in the competitiveness of exports has received less attention in Burkina Faso. Thus, to the two groups of factors described above, this article aims to highlight the particular role of public infrastructure spending in the competitiveness of intra-WAEMU Burkina Faso exports. It focuses on the sense of causality between the competitiveness of exports and the expenditure on public infrastructures is investigated. The main question of the study is stipulated as: what are the determining factors of the competitiveness of intra-WAEMU exports of Burkina Faso?

The overall objective of the article is to analyse the determinants of the competitiveness of intra-WAEMU exports of Burkina Faso. Specifically, first analysed the special role of public infrastructure spending in the competitiveness of intra-WAEMU exports by analysing the direction of causality between the two factors and secondly identified the determinant factors of the competitiveness of intra-WAEMU exports of Burkina Faso.

Theoretical approach of the role of public infrastructure spending in stimulating economic performance

The theoretical debates on the role of public infrastructure spending in economic performance have been at the heart of the preoccupations of classics, theorists of exogenous growth and those of endogenous growth. For the classics, spending on public infrastructure is a source of market imbalance because of the crowding out effect they generate. In the development of exogenous growth, attention is not paid to the role of public infrastructure spending as the determinants of long-run economic growth are population growth and increased productivity due to technical progress that turns out to be exogenous in their model. In endogenous growth theory, on the other hand, the assumption that is usually supported is the existence of a positive correlation between economic growth and public infrastructure spending. This theory explains the mechanisms of transmission of public infrastructure expenditures to economic performance through direct and indirect effects (Aschauer, 1989a, b; Barro, 1990; Kopp, 2007).

Theoretical framework

The theoretical framework considered in this article is the theory of endogenous growth. In fact, economic models of the role of public infrastructure spending in the performance of the economy are based on the endogenous growth model. The seminal work of Aschauer (1989a, b) shows the contribution of public infrastructure spending to the productive performance of economies. The author has thus estimated a production function broadened to public capital to highlight the specific contribution of public infrastructure spending to the improvement of overall productivity. His work was the basis of an explosion of new endogenous growth models that now see public infrastructure investment as a self-sustaining gain factor for productivity and long-term competitiveness. Among these developments, the

flagship model is that of Barro (1990).

This model highlights the role of infrastructure in the competitiveness of exports where the infrastructure intervenes as well in the sphere of production as in that of marketing thanks to the direct and indirect effects they generate. When infrastructure is poor or inefficient, this leads to higher direct costs of production and longer delivery time, greatly increasing trade costs and thus reducing the competitiveness of exports. Therefore, an improvement in public infrastructure investments contributes to reducing transport and energy costs and, consequently, contributes to improving the country's trade volume (Limao and Venabling, 1999). For Veganzones (2000), improving investment in public infrastructure is a driving force for the competitiveness of the economy in the long term.

Direct and indirect effects of public infrastructure spending

In the economic literature, spending on public infrastructure is assumed to increase the productivity of public and private capital through its direct effects on the public capital stock. Meade (1952) indicated that improved public infrastructure spending boosts the productivity of all traditional factors of production, ultimately improving the economy's ability to produce and sell.

This representation highlights the multiplier effect of public expenditures which is based on the Keynesian scheme of building a new infrastructure. For example, the construction of new roads makes use of the branch of Buildings and Public Works (BTP). However, this branch employs a large volume of labour and therefore distributes income. Other public infrastructures, particularly energy, allow the economic take-off of economies in general and developing economies in particular. This statement is supported by Murphy et al., (1989) who considered spending on energy infrastructure as a trigger for private investment, a source of productivity gains and poverty reduction. Thus, the transmission mechanism of investment in public infrastructure on the productive capacity of the economy can be highlighted as: the increase in investment causes an increase in employment which in turn increases consumption through income distributed, and consumption increases the productive capacity of the economy.

Another direct element of public infrastructure investment is its ability to improve accessibility through the facilities offered by construction and road maintenance. For Hansen (1959), public spending is likely to increase the potential of opportunities in terms of interactions between localities. Reggiani (1999) presented a synthetic review of the concept of accessibility and the main measures used in the different studies. The author shows that access to a locality is a combination of two elements. The first element, described as a "driving element ", justifies the need for displacement. This driving element is the set of opportunities in the destination area. It could be a potential market or a rich zone in raw materials. As for the second element, it is called "resistant element" since it highlights the distance, time and cost of transport. An additional injection of public infrastructure expenditure is likely to result in lower travel costs which in turn ensure better accessibility of the destination area.

Indirect effects are usually the product of short-term direct effects. This is for example, the spatial distribution of externalities (economy external and increased productivity) and attraction of new activities. At the economic level, public expenditure is justified by the fact that it facilitates the production process in both the short and long term by ensuring a better circulation of products and factors of production and by improving the commercial relations between the economies. Thus, investment in public infrastructure is seen as a source of external savings by Barro (1990) and Tefra (1996). However, the realization of external economies in the theory of endogenous growth makes it possible to reduce the decrease in the marginal productivity of traditional factors and consequently to generate returns to scale.

In the recent empirical literature, this transmission scheme is no longer doubtful especially in developing economies. In this regard, Nubukpo (2003) showed that public expenditure is indispensable when it is intended to finance economic growth in a global way. In the same way of analysis, the Banque Mondiale (2017) has recognized the need to invest in public infrastructure to improve the economic performance of developing countries.

Debates on the direction of causality

Although the positive role of public infrastructures expenditure is confirmed by most empirical

analyses, it is necessary to emphasize that the direction of causality has less occupied the attention of the authors. However, a few rare analyses have been given to test the reverse causality based on Wagner's (1883) law. Indeed, analyses reached the conclusion that it is economic development that causes the public infrastructure spending since it allows the state to broaden its tax base (Einser, 1991; Banque Mondiale, 1994).

The direction of causality between public infrastructure spending and export competitiveness in Burkina Faso remains unknown to our knowledge, hence the need in this article to analyse the direction of causality between the two elements.

METHODOLOGICAL APPROACH

The methodological approach aims at defining the econometric model, the variables as well as the source of the data that are used in this work.

Specification of the econometric model

In estimating the determinants of exports in general, empirical analyses in the literature reveal that most studies used a gravity model since it can account indifferently trade between two countries with similar or very different characteristics (Fontagné et al., 2002). Also, it is a model that takes into account export and import barriers and transportation costs. In doing so, in estimating the determinants of exports in the WAEMU area, Ouedraogo (1999), Ygue and Zinsou (2010) used the gravity model. But recently, Yerbanga (2017) showed for the case of Burkina Faso that the estimation of the gravity model has a limit on the dependent variable. Indeed, the dependent variable is hybrid, that is, it is a mixture of exports and imports of the exporting country. For him, the dependent variable hybrid gravity model is not adequate for analysis of intra-EU trade and does not propose specific economic policies for exports. As a result, in estimating the determinants of intra-WAEMU exports from BF, the author made an alternative estimate by considering only exports from BF to WAEMU.

An analysis of the alternative model of Yerbanga (2017) shows that the author dwelled on exports in terms of volume, which does not fully explain the dynamics of the external performance of the country. In concrete terms, the volume of exports of Burkina Faso may increase and its export competitiveness rate remains constant. To deal with this issue, our estimation method adopted as dependent variable, the export rate to measure the intra-WAEMU performance of the BF. It is an export competitiveness indicator with values between 0 and 1. As such, it is a limited dependent variable. Otherwise, the variable is not known when the values taken by the export rate come out of the range above. The variable is therefore censored.

With reference to Bourbonnais (2011), the specification of the appropriate theoretical model in this situation is the censored Tobit. This choice is also guided by the fact that the competitiveness of exports is observable only if the country has recorded marketable production. Therefore, the use of ordinary least squares is not possible. To demonstrate this, consider y_i^* a latent variable representing the amount of exports competitiveness and x_i a set of explanatory variables. The classic model is written as:

$y_i^* = x_i\beta + \varepsilon_i$

where:

x_i, the explanatory variables, β, the coefficients and ε_i, the error term.

The observed values of export competitiveness are represented by y_i and defined as follows :

$y_i = y_i^*$ if $y_i^* > 0$ and $y_i = 0$ if $y_i^* \leq 0$

For values of y_i^* null or negative, the country does not accept export competitiveness. As a result, the model data is censored on the left and y_i follows the normal censored law. Noting c_1 the lower limit of the export rate membership interval, the model can be rewritten as follows :

$y_i = y_i^*$ if $y_i^* > c_1$ and $y_i = c_1$ if $y_i^* \leq c_1$ from where $y^* = x_i\beta + \varepsilon_i$ with y^* the expectation of the latent variable but $E(y_i^*) = x_i\beta$ $E\left({}^{y_i}/_{y_i} > 0\right) \neq x_i\beta$ and $E(y_i) \neq x_i\beta$

The hope of y_i is given by :

$$E(y_i) = Prob(y_i = c_1) \times E\left({}^{y_i}/_{y_i} = c_1\right) + Prob(y_i > c_1) \times E\left({}^{y_i}/_{y_i} > c_1\right)$$

Let φ the distribution function of the law of probability of errors and φ the density function associated with it. In this case, we have:

$$\begin{aligned} Prob(y_i = c_1) &= Prob(y_i^* \leq c_1) \\ &= Prob\left(\frac{y_i^* - x_i\beta}{\sigma} \leq \frac{c_1 - x_i\beta}{\sigma}\right) \\ &= \emptyset\left(\frac{c_1 - x_i\beta}{\sigma}\right) \end{aligned}$$

$$Prob(y_i > c_1) = Prob(y_i = y_i^*) = \frac{1}{\sigma}\varphi\left(\frac{c_1 - x_i\beta}{\sigma}\right) = 1 - \varphi\left(\frac{c_1 - x_i\beta}{\sigma}\right)$$

What allows to write $E\left({}^{y_i}/_{y_i} = c_1\right) = c_1$

As well, $E\left({}^{y_i}/_{y_i} > c_1\right) = E\left({}^{y_i^*}/_{y_i^*} > c_1\right) = (x_i\beta + \sigma\frac{\varphi[(c_1 - x_i\beta)/\sigma]}{1-\emptyset[(c_1 - x_i\beta)/\sigma]}) \neq x_i\beta$

Is $E(y_i) = \emptyset\left(\frac{c_1 - x_i\beta}{\sigma}\right) \times c_1 + [1 - \emptyset\left(\frac{c_1 - x_i\beta)}{\sigma}\right)] \times (x_i\beta + \sigma\frac{\varphi[(c_1 - x_i\beta)/\sigma]}{1-\emptyset[(c_1 - x_i\beta)/\sigma]}) \neq x_i\beta.$

In agreement with Bourbonnais (2011), this last equation reflects the fact that it is not possible to use the least squares method for estimating model parameters.

By settling the estimated model of the latent variable $\hat{y}_i^* = x\hat{\beta}$and by doing the terms of the second member of $E(y_i)$then after simplification, the equation of y_i is given by:

$$y_i = c_1 \times \emptyset((c_1 - \hat{y}_i^*)/\sigma) + (1 - \emptyset((c_1 - \hat{y}_i^*)/\sigma) > 0) \times (\hat{y}_i^* \times (1 - \emptyset\left((c_1 - \hat{y}_i^*)/\sigma\right)) + \sigma \times (\varphi((c_1 - \hat{y}_i^*)/\sigma)))$$

This last equation represents the Tobit which is estimated in this article. Given the censoring interval of the dependent variable, the Tobit with left and right censorship is written as follow:

$$\begin{cases} y_i = 0 \; si \; y_i^* \leq 0 \\ y_i = x_i\beta + \varepsilon_i \; si \; 0 < y_i^* \leq 1 \\ y_i = 1 \; si \; 1 < y_i^* \end{cases}$$

In these conditions, 0 and 1 represent the thresholds of censorship of the export rate.

The Tobit equation can be rewritten taking into account the variables retained as follows:

$$TEXP_t = \beta_0 + \beta_1 DIP_t + \beta_2 GDPH_t + \beta_3 NGP_t + \beta_4 DF_t + \beta_5 RFDIP_t + \beta_6 ICE_t + \varepsilon_t$$

Presentation of the variables

In the last Tobit equation, some types of variables are presented.

Dependent variable

The variable that is explained in this work is the competitiveness of intra-WAEMU exports from Burkina Faso. It should be noted that several indicators including export rate makes it possible to measure the competitiveness of exports. While the net export index is often used as a proxy for the competitiveness of the economy, it must be emphasized that it is an indicator of the commercial performance resulting of the economic competitiveness (Latruffe, 2010). For this reason, the export rate is used as an indicator of export competitiveness in this article. As translated above, it measures the share of GDP that is devoted to the satisfaction of intra-WAEMU demand.

Independent variables

With reference to the economic literature, several variables are likely to influence the competitiveness of exports. These variables are classified into two groups. On the one hand there is the group of the supply variables and on the other hand, the group of the demand variables (Artus, 1987). This article does not attempt to analyse separately the contribution of supply and demand variables. It simply groups them in the group of explanatory variables. Thus, the following variables are retained:

The expenditures on public infrastructure (DIP) which represent all the expenses incurred for the construction, maintenance and technical operation of public infrastructures. An increase in public infrastructure investment contributes, thanks to the combination of direct and indirect effects, to lowering the cost of production because of the fall in the cost of transport and energy and consequently to an improvement in the productivity of enterprises and starting from the economy as a whole. The expected theoretical sign is therefore positive.

GDP per capita (GDPH) is a variable that reflects the level of economic development of the country. Its growth is synonymous with the national economy ensuring a sphere of production and effective marketing. The expected effect is positive.

The general price level (GPL) is an indicator of macroeconomic stability. An enhancement of the NPM reduces the capacity of the national economy to cope with intra-WAEMU competition as it can lead to a distortion in the choice of productive investments by disfavouring long-term investments. As a result, the expected effect is negative.

Financial development (DF) represents the capacity of the national economy to finance

domestic demand for credit. It is measured by credit as a percentage of GDP given to the private sector by Commercial Banks and other financial institutions. Theoretically, a strong access to credit favours economic activity and thus contributes to improving the competitiveness of exports. Thus, the expected effect is positive.

The ratio of foreign direct investment (RFDIP) is obtained by comparing foreign direct investment to GDP. This variable captures the pressure of domestic demand on exports. When it is high, it reflects high absorption, which gives companies the appearance of economies of scale. According to Henry (1994) the macroeconomic analysis considers that there is a complementary relationship between the export and the foreign investment ratio. As a result, the expected sign is therefore positive.

The Import Foreign Trade (ICE) represents all the tax levied by the state on foreign trade. In general, taxation is done on imported products. Thus, its increase causes a decline in imports of BF from the WAEMU zone as products become more expensive. The expected effect is positive.

Data

The data used in this article is essentially secondary data and cover the period from 1980 to 2015, (thirty-six years) and come from three databases. Data bearing on public infrastructure spending were collected from the Ministry in charge of Burkina Faso infrastructure. The financial development, foreign direct investment ratio and GDP per capita are from the World Development Indicator database (WDI). The export rate, i MPOT on foreign trade and the general price level (NPM) come from the BCEAO database.

RESULTS AND DISCUSSION

This section first presents the econometric results before the discussion of the results.

Results of hypothesis tests

Several tests were carried out on time series.

Normality test

The normality test for errors is based on the null hypothesis of normality of errors against the alternative hypothesis of their non-normality. The result of the test gives a probability greater than chi-square of 0.2098. At the 5% threshold, it is concluded that the errors are normal.

Stationarity test

To appreciate the stationarity of series studied the ADF (Dickey and Fuller, 1981) and the PP (Philips and Perron, 1988) are applied. The ADF test makes it possible to take into account the correlation between the different series and that PP improves the ADF test by providing a correction to the non-parametric test, correlation and heteroscedasticity problems. This combination makes it possible to obtain more appropriate results since when a variable is stationary in level for the ADF test and in the first difference for the PP test it is the PP test which is retained. The hypothesis, i.e., tested is the presence of a unitary root against the alternative hypothesis of the stationarity of series. The result of these two tests indicates that all the series are non-stationary in level, but stationary in first difference. Thus, they are integrated of order 1.

Co-integration test

The co-integration test makes it possible to assess the convergence, at least in the long run, between the export rate and public infrastructure expenditure. Also, it allows to indicate the presence or not of a causality in the sense of Granger between the two series. The trace test by Johansen (1988) allows us to conclude that the series are wedged with the presence of a single co-integrating vector since at rank equal to (=), the trace statistic (2.19) is less than the value of 3.76 at the 5% threshold.

Nature of the relationship between public infrastructure spending and export competitiveness: The Granger's causality test

It has been previously established that there is a co-integration relationship between public infrastructure expenditures and the intra-WAEMU export rate. This result indicates the existence of Granger causality between competitiveness exports and spending in public infrastructure but does not specify the direction of causality. To establish it, the causality test of Granger (1969) is applied.

Granger's causality test shows one-way causality from public infrastructure spending to the export rate. In doing so, it is the public infrastructure spending that drives the competitiveness of Burkina

Table 1. Result of the Granger's causality test.

Null hypothesis	Calculated statistic	P-value
Export rate does not cause spending on public infrastructure	2.1636	0.339
public infrastructure spending cause the export rate	8.5524 **	0.014

**significant at 5%
Source: (SIGUE Moussa, 2018).

Table 2. Result of Tobit estimation

Variables	coefficients	Standards Errors	t
Diff_ln_DIP	0.0150625 **	0.0068622	2.20
Diffln_FDI	0.011213 *	0.0062511	1.79
Diff_ln_ICE	0.1151241 **	0.0472832	2.43
Diff_ln_DF	0.0769821	0.0599504	1.28
Diff_NGP	- 0.3581174 ***	0.0733301	-4.88
Diff_GDP	0.3646131 **	0.135523	2.69
constant	-6.179222 ***	0.828388	-7.46
Sigma	0.0362616 ***	0.0043341	8.37
Prob> chi2	0.0000		

***significant at 1%; **significant at 5%; *significant at 10%
Source: (SIGUE Moussa, 2018).

Faso's intra-WAEMU exports (Table 1). This result contradicts Wagner's law (1883), for which it is economic development that causes spending on public infrastructure. For the explanation, it is necessary to notice that economic growth is the aggregate result of all sub-sectors of the economy. As a result, a country may experience sustained economic growth while one of its sub-sectors is unproductive. Let's take the case of intra-WAEMU exports from Burkina Faso. Because of its low competitiveness compared to other EU countries, this sub-sector contributes very little to tax revenue. Moreover, the exports that are more related to the state budget in terms of revenue do not go to WAEMU but rather to the zone outside Africa. At this level, Burkina Faso's exports are limited to livestock products, those from extractive industries, but also cotton.

Estimated Results

The estimation method used for the Tobit estimation is the likelihood maximization algorithm. The reason is that the ordinary least squares method makes appear threshold values in the observations of the dependent variable (Bourbonnais, 2011). The result of the estimation is presented in Table 2.

The result of the estimation shows that apart from financial development, the coefficients of the other variables retained in the model are significant at least 10%. Also, it should be emphasized that the signs obtained are in line with the theoretical expectations. Thus, the NPM negatively affects the competitiveness of exports at the 1% level. Public infrastructure spending, foreign trade tax and per capita GDP positively affect the competitiveness of exports at the 5% level. The ratio of foreign direct investment positively influences the competitiveness of exports but at the 10% level.

Interpretations and discussions of the results

The estimation gave a significant Sigma coefficient at 1%. This reflects an overall adequacy of the model. After performing the tests of global significance and that of specification, it appears that at the 5% threshold, the estimated model is globally significant (P-value obtained is zero) and well

specified because the P-value obtained is 0.91, which makes it possible not to reject the null hypothesis of good specification of the model. Thus, it is possible to conclude in general that the model is relevant and more specifically, that it has not omitted other relevant variables.

Therefore, it is possible to interpret and discuss the obtained results. For this reason, it is imperative to consider the nature of the relationship between the explained variable and each explanatory variable. For a log-level[1] relationship, the coefficients must be divided by 100 and interpreted in terms of percentage-unit. For a level-level relationship, the coefficients are marginal effects and are interpreted in unit terms.

Expenditure on public infrastructure: the relationship between export competitiveness and expenditure on public infrastructure is of the log-level type. At the 5% threshold, when public infrastructure spending increases by 1%, the competitiveness of exports increases by 0.015/100 unit, all other things being equal. The positive sign indicates that spending on public infrastructure (transport, telecommunications, health, water, etc.) provides the national economy with the foundations for structural transformation, which is an indispensable condition of the improvement in market share. In addition, the Granger's causality test established a one-way causality from public infrastructure spending to the export rate. Thus, it is possible to conclude that it is the public infrastructure expenditures that cause the competitiveness of intra-WAEMU exports. This result is a good test of the hypotheses of endogenous growth according to which it is the State that must ensure the provision of public infrastructures and that they contribute to a competitive economy through their direct effects (improvement of the productive capacity of the public) and indirect (productivity gains, external economies and spatial diffusion of positive externalities). This result highlights the particular role of public infrastructure spending in the competitiveness of intra-WAEMU exports from Burkina Faso.

[1]It is shown that $\frac{\beta}{100} = \frac{\delta \text{Diff\_te}}{\%\Delta\varphi}$ with φ the concerned variables(*Diff_ln_DIP, Diffln_FDI, Diff_ln_ICE, Diff_ln_DF)*

However, the mechanism of transmission of public expenditure to the performance of the economies faces some limits in most developing countries like Burkina Faso. In fact, the increase in employment created by the construction industry generates additional income, but this income partly increases the demand for imported consumer goods, which in fact contributes very little to productive capacity of local industries and thus the competitiveness of exports.

Foreign trade tax: the relationship between export competitiveness and the foreign trade tax is of the log-level type. Thus, at the 5% threshold, an increase in taxes on foreign trade of 1% increases export competitiveness of 0.115/100 unit. The result is explained by the fact that the tax on foreign trade is a commercial policy instrument. Therefore, to reduce the impact of intra-WAEMU competition, the country could impose taxes on certain imported products. The objective is to encourage and to ensure the domestic production that will be used for export. Such a policy ensures "survival" of Local industries. In principle, membership in the Economic and Monetary Union forced the country to apply common taxation and negotiated multilaterally but however, qualified specific measures contingent is applied by each Union country.

NPM: the type of relationship is level-level. Its coefficient is significant and negative, which is in accordance with the theory. At the 1% threshold, a rise in the price level of one unit leads to a decline in export competitiveness of 0.358 units, all things being equal. An increase in NPM induces inflation, which results in a decline in the competitiveness of domestic products compared to products sold by other countries of the Union since these countries share the same currency and therefore are subject to the same monetary policy. As a result, if there is an increase in NPM in a country, it would be an inflation determined by the costs of production. These are themselves determined by the national production structure and the state of available infrastructure.

GDP per capita: In theory, an increase in GDP per capita reflects an improvement in the living conditions of the population, which is favourable to a positive dynamics of the economy both in the domestic and foreign markets. In this case, the national economy enters a virtuous circle since in Keynesian logic an improvement of the income of the populations constitutes a source of economic prosperity by the principle of the effective demand.

The relationship between export competitiveness and GDP per capita is level-level. This allows us to say that at the threshold of 5%, a rise in per capita GDP of one unit improves the competitiveness of intra-WAEMU exports by 0.365 units, all things being equal. According to Yerbanga (2017) the positive sense of the coefficient could be interpreted as the existence of opportinuities for economic agents in the regional market in the sectors of activity where they are most concerned.

The ratio of foreign direct investment: The estimated relationship between export competitiveness and foreign direct investment ratio is log-level. The reslut of the estimation shows that its coefficient is positive and significant at the threshold of 10%. This means that an increase in foreign direct investment ratio of 1% leads to an improvement in the competitiveness of exporttions of 0.011 /100 unit. As already pointed out Yamawaki (1991), foreign direct investment creates a productive base for the national economy that generates export flows of goods and services. Thus, the ratio of foreign direct investment is a source of improvement of Burkina Faso's intra-WAEMU market share. This result is contrary to that obtained by Yerbanga (2017) who came to the conclusion that despite its positive effect, the coeffcient of foreign direct investment is not significant and therefore does not affect the intra-WAEMU exports of the country.

CONCLUSION

The use of the Granger's causality test and the Tobit estimation enabled us to establish, in the first time, the causal relationship between public infrastructure expenditures and the competitiveness of Burkina Faso's intra-WAEMU exports, and in a second time to identify the determinants of the competitiveness of intra-WAEMU exports from Burkina Faso.

In conclusion, this paper has been able to demonstrate that public infrastructure spending is one of the determinants of the competitiveness of Burkina Faso's intra-WAEMU exports and that there is a unidirectional causality and the direction goes from the expenditures on the infrastructure of the countries towards competitiveness. In addition, GDP per capita, the general price level, the foreign trade tax and the foreign direct investment ratio were identified as other factors determining the competitiveness of Burkina Faso's intra-WAEMU exports.

The analysis carried out may give rise to what could be an economic policy implication of improvement of the intra-WAEMU market share of Burkina Faso. In this respect, in order to strengthen the competitiveness of exports to the Union market, the public authority must provide the national economy with quality public infrastructures in order to benefit from their direct and indirect effects on the economic structure. This necessarily involves an improvement in public infrastructure expenditures. Also, the state must take measures to mobilise more foreign direct investment, increased the tax on foreign trade. The latter measure has a double effect. On the one hand, it enables local industries to prosper and, as a result, offers sources of tax revenue to the state and, on the other hand, serves to further finance investments in public infrastructure.

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APPENDIX

Annex1. stationarity test.

variables	Statistics		P-values		decisions	Integration orders
	ADF	PP	ADF	PP		
Export rate	-6.496	-5.496	0.0000	0.0000	Stationary in first difference	I (1)
Public infrastructure expenditures	-5.861	-8.911	0.0000	0.0000	Stationary in first difference	I (1)

Annex 2 result of the Granger causality test.

Equation	Excluded	chi2	df	Prob > chi2
Diff_TE	Diff_DIP	2.1636	2	0.339
Diff_TE	ALL	2.1636	2	0.339
Diff_DIP	Diff_TE	8.5524	2	0.014
Diff_DIP	ALL	8.5524	2	0.014